

A Major Project Mid-term Report on

EcoCycleMart: Ecommerce for Recycled Products

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Bachelor of Engineering in Software Engineering
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ABSTRACT

Environment is the major source of industrial raw materials. The heavy need of raw materials has been burden for the environment. In the other hand, waste management has been another big issue. This has made us environmentally conscious than ever. We can reduce dependency on environment for raw materials by recycling. For example, Recycling paper reduces the demand for trees to be cut down. Recycling is less energy consuming than manufacturing from scratch. Manufacturing leads to heavy green house gas emissions while they recycling significantly reduces it. Recycling is cost efficient.

EcoCycleMart is the e-commerce platform for the recycled eco-friendly goods where the sellers can list their goods and the buyers can purchase them. The project aims to provide help to the small and medium scale recycling based businesses to find the consumer for their goods. It also ensures consumers, the best quality goods in affordable price. In the long run, the project sets its objective to aware and encourage everyone to use the recycled products for noble cause of environmental protection and sustainability of resources. In summary, this project promotes low capital business, ensures fulfillment of needs for quality products without exploiting environment for resources and minimize the waste management issues.

The major deliverable proposed in the project is a web based application with user-friendly User Interface and AI based recommendation system .

Keywords: *Environment, Waste, Recycle, E-commerce, EcoCycleMart*

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1. Introduction

EcoCycleMart is a web based application that provides platform for selling and buying recycled goods. With a view of encouraging the use of recycled goods, the application aims to fulfill needs for quality goods without exploiting the environment for resources and minimize the waste management issues. In the long term, it targets to conserve environment and maintain ecological balance. This document looks forward to providing essential information about the needs, scope, and methodology being used in the application.

E-commerce has a great potential to contribute to the economy and prosperity of nation, but having observation at the statistics, the ratio of contribution of e-commerce is not satisfactory. The recycle based e-commerce market is almost negligible in Nepal. According to Nepal Rastra Bank, the total contribution of the e-commerce to the total GDP of Nepal was almost \$600 million comprising just above than 1% in 2022/2023.

The government of Nepal has taken efforts to promote recycle based e-commerce. Taking this in consideration the authors are to build the e-commerce web application specially tailored for the low capital recycle based business and consumers looking for goods at affordable price.

The impact on the environment is severe due to the industries . The issues like climate change, global warming, greenhouse effects etc. has made our planet the ill place to live. In the other hand the waste have been everywhere not managed and left alone. So, why not make use of this thing and contribute towards making earth good place to live.

1.1 Problem Statement

In today's consumer-driven society, the massive production and disposal of goods have led to a significant burden on our planet's resources and ecosystems. The linear 'take-make-dispose' model of production and consumption leads to environmental degradation, invites climate change, and accelerates the depletion of finite resources. Despite growing awareness of these issues, there remains a lack of accessible and convenient options for individuals to adopt more sustainable consumption habits. Furthermore, while recycling is recognized as a crucial component of sustainable waste management, there exists a disconnect between the availability of recycled products and consumer demand. Managing multiple vendors to ensure a diverse and high-quality inventory of recycled goods while maintaining consistent standards and compliance has been pain in neck. Vendors and marketplace administrators need access to detailed analytics and reporting to make informed business decisions. Users want easy access to the curated list of products that suit their need and preference.

1.2 Project Objectives

The project has put forward the following objectives:

- To make the alternative solution for ecommerce activities.
- To promote the local, small and Medium enterprises for recyclable products.
- To implement Artificial Intelligence applications for personalized sales.

1.3 Significance of the Study

The project is significant owing to the fact that we are living in digital world, and the project will certainly be fruitful in achieving the objectives set by the Government of Nepal regarding Ecological Balance, Waste management and promoting e-commerce. Since the idea is one of the first of its kind, it is expected that the project will reach to a significant majority of sellers and buyers. Understanding the security requirements and compliance regulations helps in implementing robust security measures to protect sensitive data, thereby building trust among users. Multi-vendor marketplaces offer consumers a wide variety of products from different vendors, increasing choices and fostering competitive pricing. By studying the user interface and experience, improvements can be made to provide a seamless, user-friendly shopping experience, enhancing customer satisfaction. Feedback mechanisms ensures that vendors are held to high standards, maintaining the marketplace's reputation. Implementing AI for catering products based on customer needs, preferences and history.

1.4 Scope

In the beginning phase, the basic e-commerce concept is to be implemented and other features are to be added later gradually if possible. Such possible extensions could be addition of google authentication, chat bots, AI based recommendation for products, payment integration, rating and reviews etc. The sellers can make their accounts including profiling and list their products in the platform. The buyers can wishlist, add to cart and purchase the products. The users can signin/signup using their google account. They can also rate and review the products. The buyers and sellers both will have separate dashboards. The application will be able to process payments using the feasible payment providers/services in Nepal.

1.5 Limitations

The following are the limitations of the project that are realized:

- The application is web based but native applications such as mobile and desktop application is not built.
- Only support khalti as payment service provider.
- Individual payment settlement.
- Does not support SMS notification.

2. Literature Review

This section consists description of the literature study performed during the development of this project.

2.1 Paper Recycling by Jamarko

Jamarko was established in 2001 as a small cottage industry with the view of contributing towards environmental conservation and to provide employment to the underprivileged, especially women. While Jamarko's short-term objective is to minimize the amount of waste paper, the long-term goal is to help conserve natural resources and habitats, and promote local handmade products. At Jamarko, they collect paper waste from various sources, and recycle them to produce recycled paper products. Its official website (<https://jamarko.com.np/>) is aimed at providing a platform for buying and selling of recycled products digitally.

2.2 GoodTrade Magazine's view on recycle based E-commerce

Seeking out ethical online marketplaces to purchase our recycled products helps support businesses that prioritize ethical practices, sustainability, and social responsibility. Giant online retailers like Amazon and Wish have faced criticism for their environmental impact, labor practices, and monopolistic tendencies, raising concerns about the ethics of supporting such platforms. Actively choosing to shop at ethical marketplaces helps our capital reach marketplaces that value and respect sustainable business practices and fair labour practices.

2.3 Existing Similar Applications

While EcoCycleMart carves its niche in the sustainability landscape, let's delve deeper into existing solutions with distinct platforms:

Material Marketplaces

Platforms like Material Exchange (<https://material-exchange.com/>) and Loop (<https://exploreloop.com/shop/>) focus on connecting businesses with recycled materials for industrial use. They provide a B2B marketplace for manufacturers seeking to incorporate recycled content into their products.

Strengths: High volume transactions, facilitates large-scale recycling integration.

Weaknesses: Not targeted at individual consumers.

Curated Recycling Platforms

Project Regeneration (<https://regeneration.org/>) offers a curated online marketplace for high-end, designer furniture crafted from recycled materials. They partner with skilled artisans who transform salvaged materials into unique pieces.

Strengths: Promotes high-quality, one-of-a-kind recycled products, caters to a specific design-conscious audience.

Weaknesses: Limited product variety, potentially higher price points

Hyperlocal Recycling Initiatives

Apps like Bunz (<https://www.bunz.com/>) or Freecycle (<https://www.freecycle.org/>) facilitate localized exchange of unwanted items, including some recycled goods. They foster a hyperlocal community feel and promote a sharing economy.

Strengths: Encourages reuse and community building, reduces transportation needs.

Weaknesses: Limited product selection, can be challenging to find specific recycled items due to the non-curated nature. These existing solutions, with their distinct platforms, highlight various approaches to promoting recycling. However, they often cater to specific niches or lack the comprehensive focus on individual consumer-to-consumer buying and selling of a wide range of recycled goods that EcoCycleMart aims to achieve.

3. Methodology

This section describes the methodology that is being followed during the development of the project.

3.1 Software Development Life Cycle

The project is to be developed as per iterative and incremental model of software development life cycle as depicted in Figure 1. The reason for choosing this model is its cyclic approach and adaptive flexibility, as well as very high chances of the changes of requirements in the process of development.

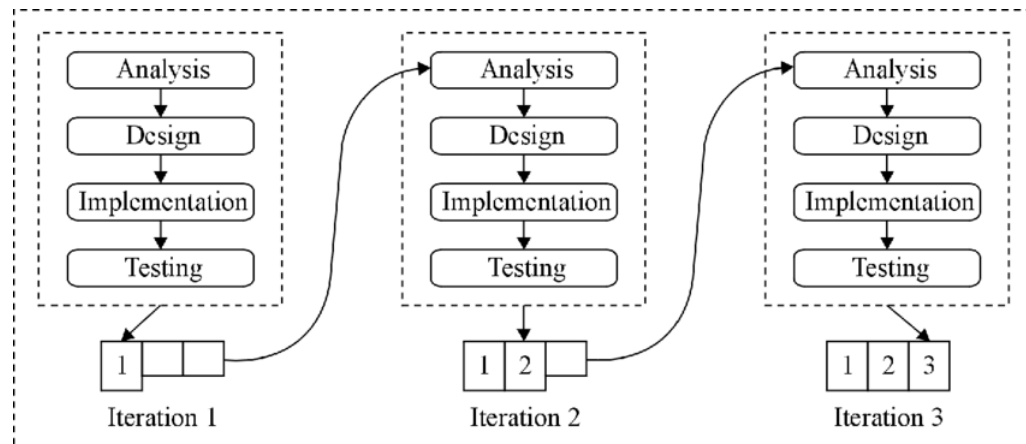


Figure 1: Software development life cycle(Iterative and Incremental Approach)

The life cycle begins with the first iteration, when the team collects and evaluates the requirements that are expected from the application. The design and implementation phase is to design and build both backend and client side applications. By the end of this iteration, a Minimal Viable Product (MVP) will already have been constructed. In the testing and debugging phases, the quality control methods is applied to both frontend and backend. If any changes in requirement are needed, then it can send feedback to the analysis phase that will mark the beginning of the new iteration. The project is expected to be completed in 3 iterations.

3.2 Technical Architecture

The application is built upon the client-server web architecture, as illustrated in Figure 2.

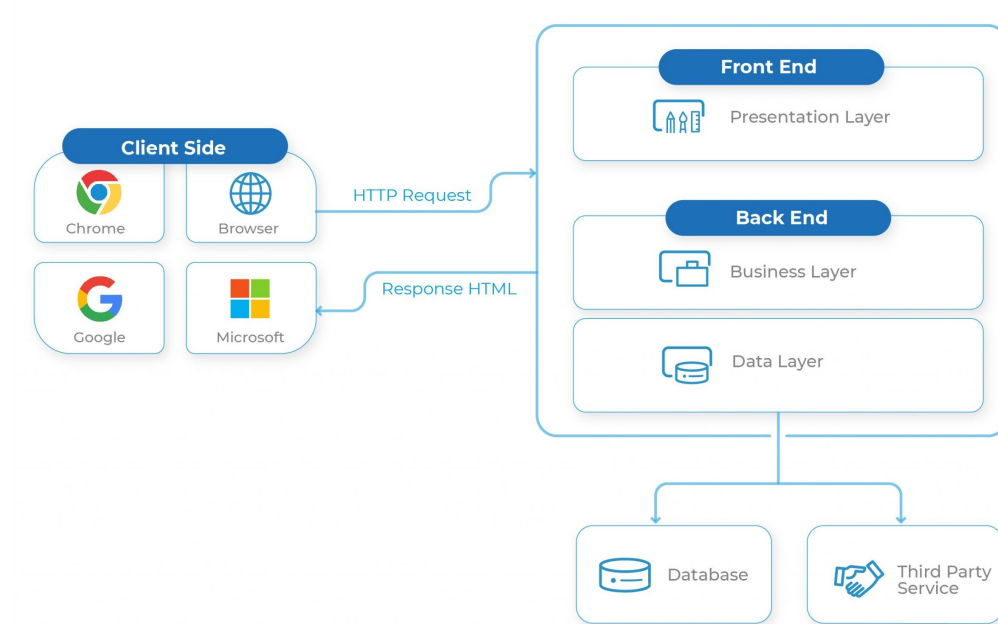


Figure 2: Used architecture of the application

At the heart of the architecture lies the RESTful web service which communicates directly with the central database where all the data is stored. The client application do not access the database directly, but via the API service. The clients send HTTP requests like GET, POST, PUT and DELETE while the API service processes those requests and return the data in JSON format.

3.3 Used Technologies

Table 1 consists of the major technologies that are used during development and deployment of the application.

Subject	Used Technology
Database	MongoDB
REST API Service	Express REST Framework
Frontend	HTML, CSS, ReactJs
Backend	NodeJs, ExpressJs
Admin Web Interface	ReactJs
Documentation	LaTeX

Table 1: Technologies to be used

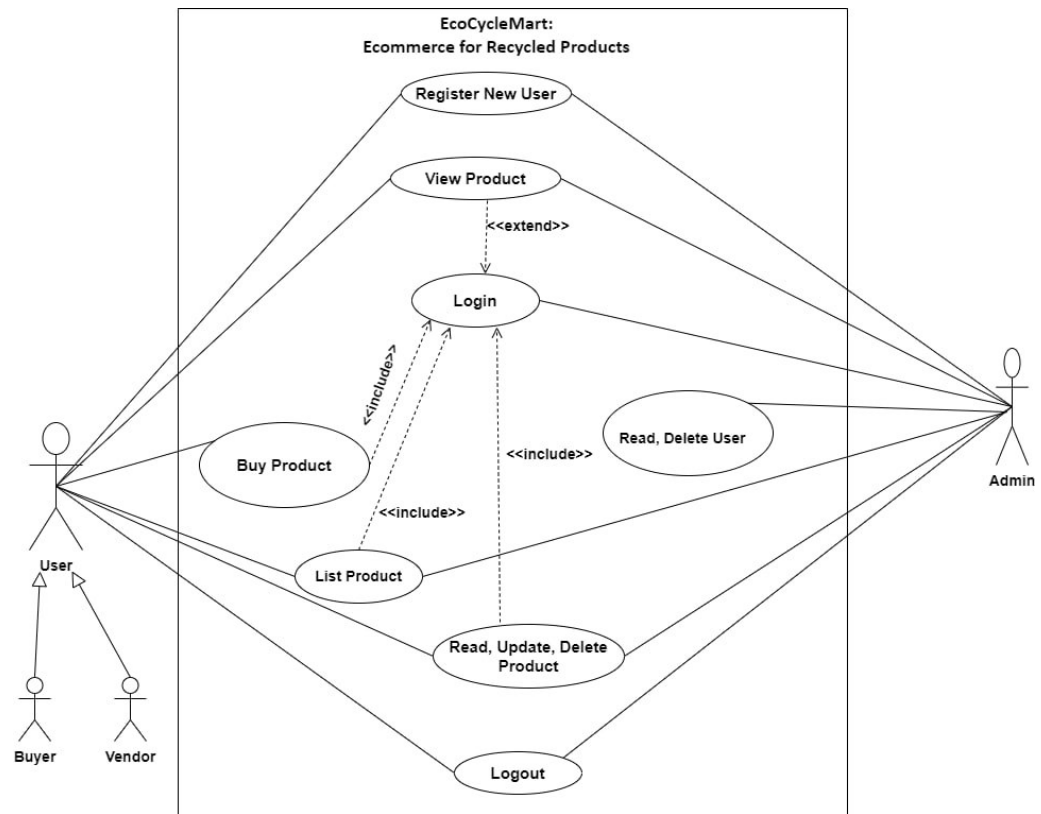


Figure 3: Use Case Diagram

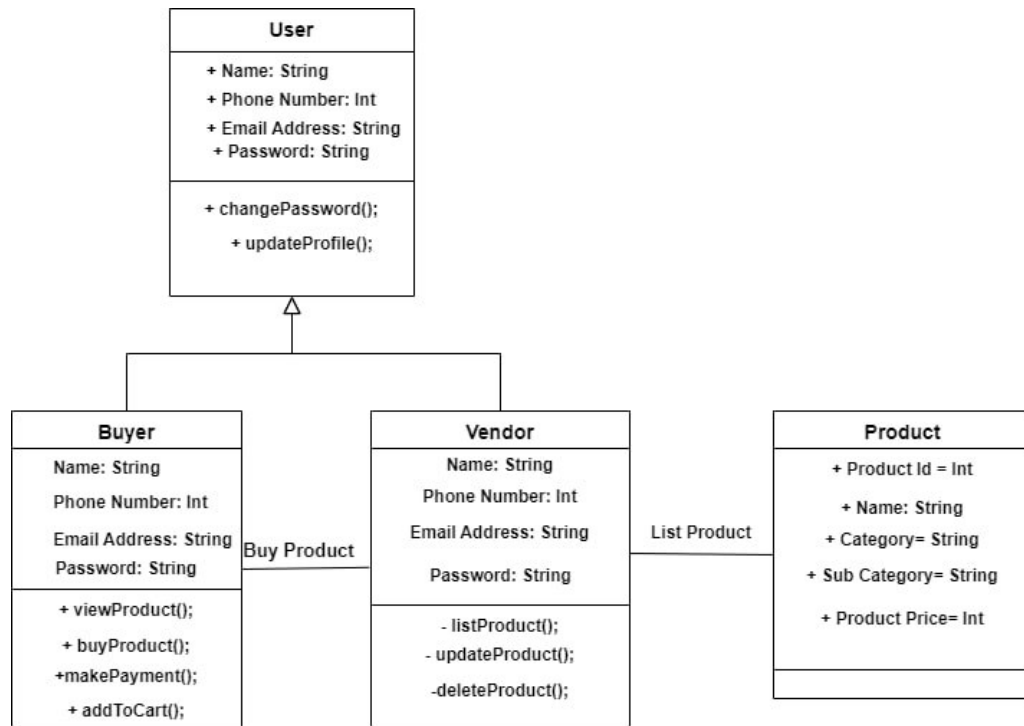


Figure 4: Class Diagram

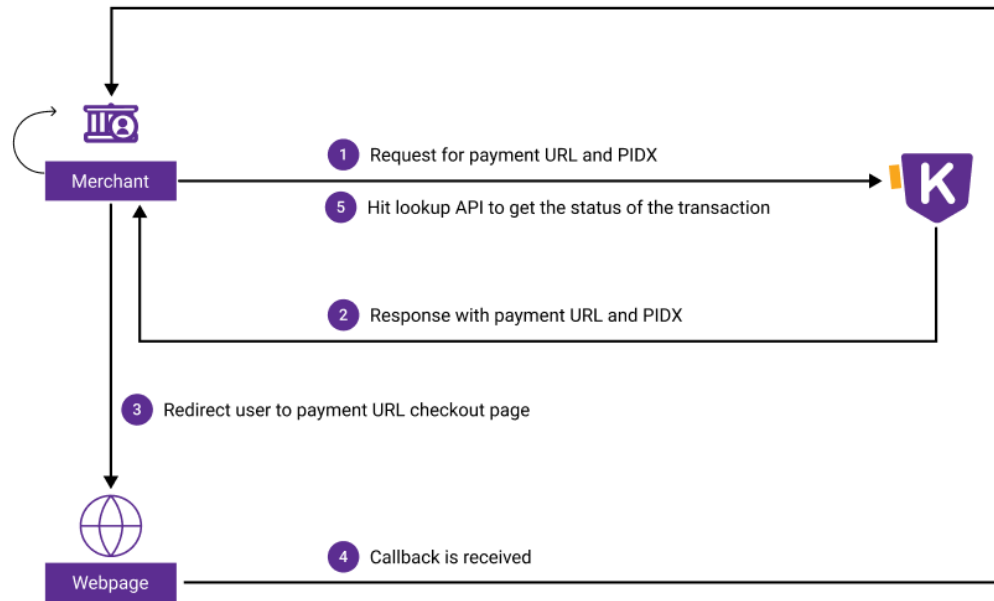


Figure 5: Khalti payment flow Diagram

4. Tasks Done so far

4.1 Admin and User Interface

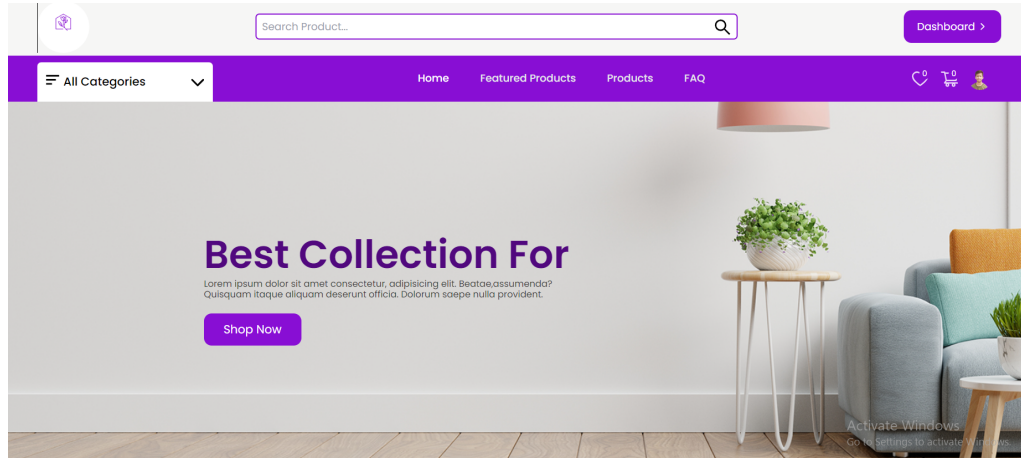


Figure 6: Landing Page

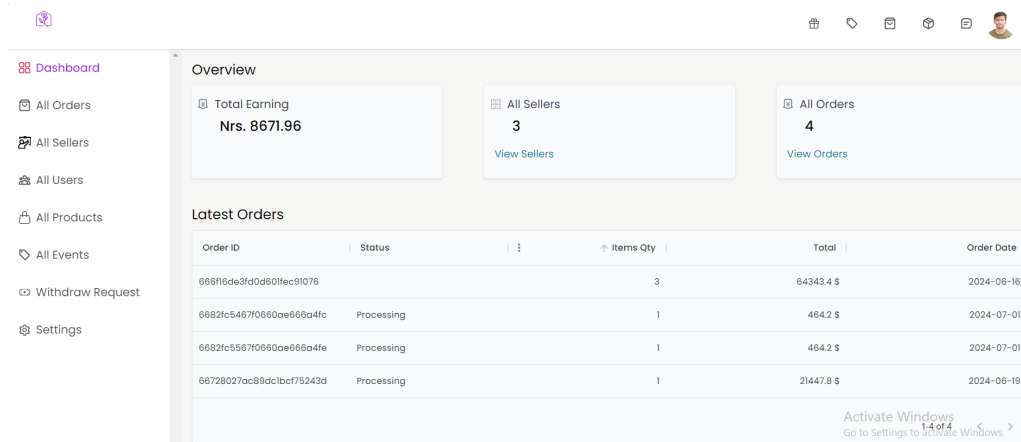


Figure 7: Admin Overview Page

4.2 Checkout and Payment Processing

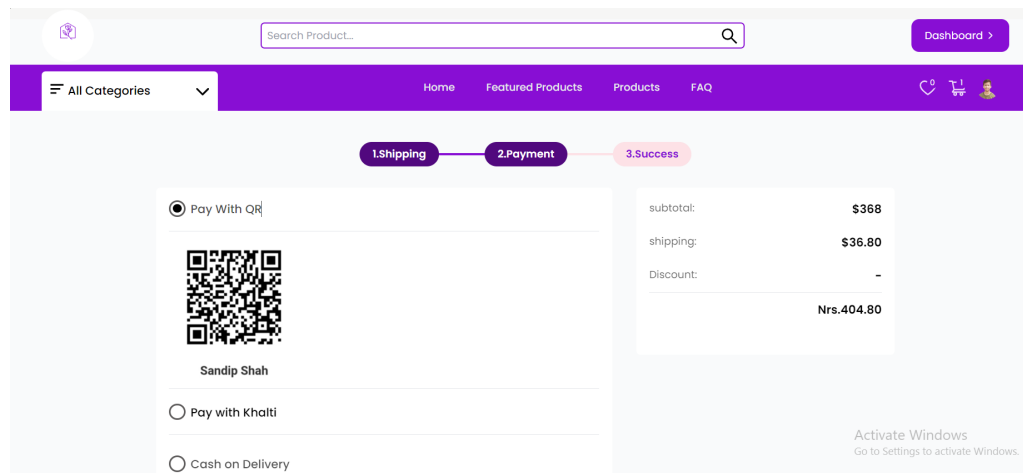


Figure 8: Checkout User Interface

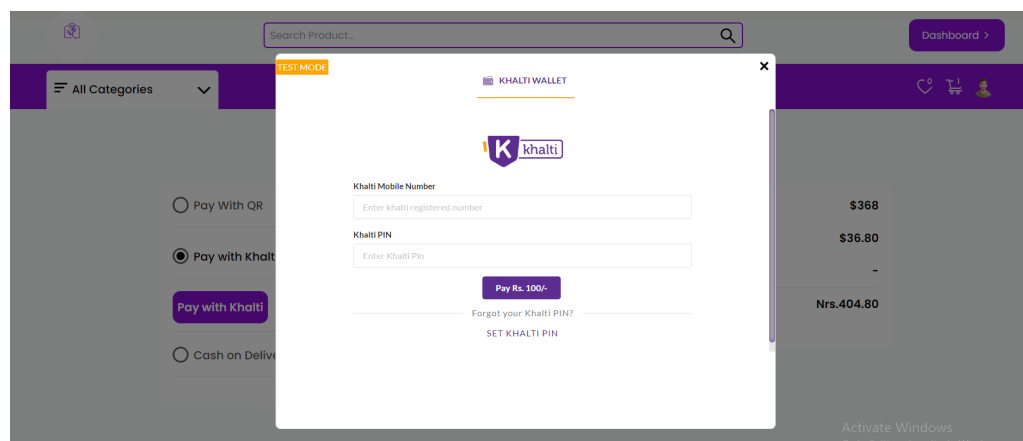


Figure 9: Payment Using Khalti

4.3 Profiling

The screenshot shows a web application's profile page. At the top, there is a search bar labeled "Search Product..." and a "Dashboard >" button. Below this is a purple navigation bar with links: "Home", "Featured Products", "Products", and "FAQ". On the left side of the page, there is a sidebar menu with the following items: "Profile" (selected), "Orders", "Refunds", "Inbox", "Track Order", "Change Password", "Address", "Admin Dashboard", and "Log out". The main content area displays a profile card with a circular profile picture of a man. Below the picture, there are four input fields: "Full Name" (containing "Admin"), "Email Address" (containing "admin@gmail.com"), "Phone Number" (containing "9825517464"), and "Enter your password". An "Update" button is located below the "Full Name" and "Phone Number" fields. In the bottom right corner, there is a message: "Activate Windows Go to Settings to activate Windows."

Search Product...

Dashboard >

All Categories

Home Featured Products Products FAQ

Profile

Orders

Refunds

Inbox

Track Order

Change Password

Address

Admin Dashboard

Log out

Full Name

Admin

Email Address

admin@gmail.com

Phone Number

9825517464

Enter your password

Update

Activate Windows
Go to Settings to activate Windows.

Figure 10: Profile Page

5. Results and Discussion

- Discussed about the user signup, admin dashboard and report format.
- Discussion on payment method and report revision.

6. Performance Analysis and Validation

The performance analysis of the deliverables will be performed according to the popular Top Down Methodology. The main idea in this method is to analyse and address the higher order performance issues at first, then follow the lead upto the lower levels of details if needed [?]. This methodology is to be followed because it largely reduces the time and cost of assessing the performance since not every modules and sections of the project need to be analyzed at a deeper level.

The final evaluation of the project will be performed by the project evaluation team designated by the college administration.

7. Tasks Remaining

- Training AI model for personalized products recommendation.
- User friendly Chatbot design and implementation.
- Rating, Reviews and Billing, Google Authentication.

8. Deliverable

The following are the major deliverables that are produced at the end of this project.

8.1 RESTful API service

There are running instances of RESTful API service developed and deployed at the end of the project. This API is responsible for communicating between the client applications and the central database server.

8.2 Frontend and Admin Dashboard

The application is developed integrating all the features proposed earlier. The sellers are able to use the application to list their products which are visible to the buyers. An interactive chat box is integrated with the application that will allow the users to make queries. The application will also be integrated with google authentication, payment processing, AI based recommendation system. The application is featured with order tracking abilities.

9. Project Task and Time Schedule

The working time period for the project is less than three months. The project is completed by the end of the spring semester as per the requirements of the university. The major task division among the team members is mentioned in Table 2.

Team Member	Assigned Tasks
Rishikesh Sharma	Project Management AI Implementation
Hansika Jha	Frontend Design Project Documentation
Sandip Shah	Frontend Development Project Documentation
Kishore Budhathoki	Backend Development Data Management

Table 2: Division of tasks among project team members

The time schedule for the development of the project is illustrated in figure 11.

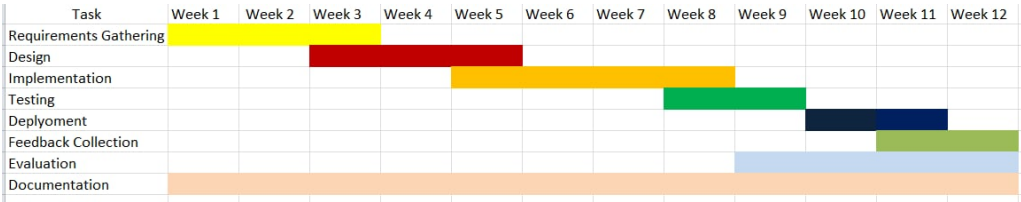


Figure 11: Gantt Chart

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